2002 NSEI (CHATHAM) SABLEFISH POT SURVEY REPORT

F/V Miss Conception

June 15–June 30, 2002

by
Beverly Richardson

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TABLE OF CONTENTS

Page

ACKNOWLEDGEMENTS 2
AUTHOR 2
LIST OF TABLES 4
LIST OF FIGURES 4
LIST OF APPENDICES 4
INTRODUCTION 5
OBJECTIVES 5
METHODS 5
  Setting 6
    Gear 6
    Bait 7
  Sablefish Marking 7
  Previously Tagged Sablefish 7
  Biological Sampling 8
  Bycatch 8
  Data Management 8
RESULTS 9
  Setting 9
  Sablefish Marking 9
  Previously Tagged Sablefish 9
  Biological Sampling 10
  Bycatch 10
APPENDICES 27

LIST OF TABLES

Page

Table 1. Target number of fish to mark in each statistical area (total N=5,000) NSEI pot survey, 2002. 11
Table 2. Survey crew on the NSEI pot survey, 2002 11
Table 3. Set summary for NSEI pot survey, June 15–June 30, 2002. 12
Table 4. Number of tags released by statistical area NSEI pot survey, 2002. 13
Table 5. Sablefish length summary for biological sub-sample and for all sablefish landed, NSEI pot survey, 2002. 13
Table 6. Sablefish maturities, NSEI pot survey, 2002 13
Table 7. Bycatch, by set and overall, NSEI pot survey, 2002 14

LIST OF FIGURES

Page

Figure 1. Sablefish survey area. 15
Figure 2. Sablefish tag placement area, NSEI pot survey 2002. 16
Figure 3. Recording set data, NSEI pot survey, 2002. 16
Figure 4. NSEI pot survey set locations and number of tags released per station. 2002. 17
Figure 5. Stacked sablefish pots, NSEI pot survey, 2002. 18
Figure 6. Slack-taking reel and sablefish pot, NSEI pot survey, 2002. 18
Figure 7. Deck set up with slack-taking reel, NSEI pot survey, 2002. 19
Figure 8. Setting gear, NSEI pot survey, 2002. 19
Figure 9. Hauling and dumping a pot into the hopper, NSEI pot survey, 2002. 20
Figure 10. Tagging station, NSEI pot survey, 2002. 20
Figure 11. Sablefish in hopper, NSEI pot survey, 2002. 21
Figure 12. Placing sablefish on tagging cradle, NSEI pot survey, 2002 21
Figure 13. Recording data, releasing sablefish into chute, and placing the next sablefish, NSEI pot survey, 2002 22
Figure 14. Tagging a sablefish, NSEI pot survey, 2002. 22
Figure 15. Sablefish with tag, NSEI pot survey, 2002 23
Figure 16. Sampling station, NSEI pot survey, 2002. 23
Figure 17. Data entry between sets, NSEI pot survey, 2002. 24
Figure 18. Percent frequency of lengths of tagged, sampled and total captured sablefish, NSEI pot survey 2002 24
Figure 19. Sablefish lengths by sex for samples, NSEI pot survey, 2002 25
Figure 20. Sablefish lengths by sex as portion of total lengths, NSEI pot survey, 2002. 25
Figure 21. Pacific sleep shark in sablefish pot, NSEI pot survey, 2002. 26

LIST OF APPENDICES

Page

Appendix A. Sablefish Pot Survey Set Form. 28
Appendix B. NSEI Sablefish Pot Survey Tag Release Form. 29
Appendix C. Sablefish maturity codes. 30

INTRODUCTION

The Alaska Department of Fish and Game contracted the *F/V Miss Conception* for 21 days, beginning June 15, 2002, to conduct the third in a series of sablefish surveys using pot gear within the Northern Southeast Inside (NSEI) subdistrict. The survey was conducted in the four major commercial fishery statistical areas in Chatham Strait between the latitudes of 56°10' N. and 57°50' N. (Figure 1). During the survey over 5,000 sablefish were captured, marked, and released. Fish were released by statistical area in proportion to the 2001 commercial harvest and distributed as evenly as possible within each statistical area. This research is part of a mark-recapture project to aid in the management of the State of Alaska's commercial sablefish fishery in the NSEI subdistrict. This report describes the methods and preliminary results of this survey.

OBJECTIVES

1. Mark a total of 5,000 sablefish that are greater than 50 cm fork length with an external "T-bar" tag at the base of the dorsal fin (Figure 2).
2. Apportion the 5,000 marked sablefish according to the sample size distribution, among Statistical Areas 345603 as far south as 56°10' N latitude, throughout all of 345631 and 345701, and in 345731 as far north as 57°50' N latitude, as evenly as possible in a north to south direction (Table 1).

   The purpose of apportioning the marked fish among the statistical areas is to distribute the marked fish approximately in proportion to the distribution of the commercial fishery catch in 2001. This apportionment is intended to promote adherence to catchability assumptions necessary to estimate abundance under mark-recapture theory.

3. Collect biological samples, including length, sex, stage of sexual maturity and ageing structures (otoliths) from a random sub-sample of 450 to 500 sablefish.

METHODS

The *F/V Miss Conception*, a 79-foot, steel-hulled commercial fishing vessel that fishes for sablefish with pots in the Bering Sea, was used to conduct the survey. The vessel was contracted for a 21-day vessel charter from Jim Miller of Concept Fisheries (phone 206-524-8410 and email conceptfish@attbi.com) for $68,995. This was the second year of a two-year contract. David (Cowboy) Hasslequist was skipper of the vessel. There were four fishing crew and a cook in addition to the skipper. The scientific staff consisted of three ADF&G staff on each leg of the survey (Table 2).

Setting

Within the constraints of attempting to distribute the marked fish uniformly north to south throughout each statistical area, the skipper was given free reign to fish in a manner that would maximize the catch of sablefish. Except for avoiding fishing on ADF&G longline survey stations, there were no location, depth, or soak-time restrictions. Sets were made in areas of potentially productive sablefish habitat. In 2002 many of the sets were made at the same or similar locations to those of the 2001 pot survey. When prospecting for new set locations the vessel surveyed the area and checked bottom bathymetry prior to setting gear.

The distribution of the tagged fish was secondary to the overall goal of tagging 5,000 sablefish. To achieve this secondary goal the following protocol was followed: 1) continue to tag fish on a set when the tagging goal for that statistical area was exceeded on that set, 2) release all fish from a set that are still in the water after goals for that statistical area have been achieved, 3) do not make additional sets in a statistical area if within 50 fish of that areas goal, 4) if scratching for fish in an area discontinue that area after achieving 80% of the goal and make up the additional fish in another statistical area.

The daily routine was to haul one set, reset that set, haul the second set and then reset it, and let both sets soak over the night. Once a set was left in the water for 41 hours while the vessel traveled to Petersburg to change crew; there was no discernable damage to these fish.

For each set, the beginning and ending latitude and longitude, anchor times, number of pots per set, and depths where each pot went overboard were recorded by ADF&G staff on the Sablefish Pot Survey Set Form (Figure 3; Appendix A). To facilitate tagging and releasing fish quickly the catches were enumerated per set and not by pot. The distribution of the location of the sets between and among statistical areas is shown on the chart in Figure 4.

Gear

The vessel provided 70 sablefish pots and the other gear necessary to longline the pots. The pots were 5-foot round sablefish pots designed, constructed, and webbed by the contractor (Figure 5). The pots were equipped with two opposing tunnels.

A string of gear consisted of floating line with two 18” hard buoys followed by two large plastic buoy bags, 50 fathoms (fm) of line, a sash weight, buoy line equal to ±350 fm depending on set depth, a surge weight, 50 fm of line, an anchor, and the groundline which was configured with 40 beckets spaced at 50 fm intervals. At the end of the ground line were a second anchor and the reversal of the gear. In 2002 35 pots were set on each string. Pots were placed onto the string leaving a blank becket at each end by the anchor and spacing the 35 pots at 50 fm intervals thereafter with the exception of the last couple of pots that were placed at every other becket, at 100 fm intervals. By spacing the pots throughout the length of the string of groundline a set covered roughly 2.2 miles regardless of the number of pots on the set.

Two strings of groundline, running line, and buoy line were stored on a slack-taking reel, in addition two more strings of line were stored in, and could be hauled directly into, the bait hold (Figures 6 and 7). As determined during the 2001 pot survey two strings of 35 pots each covered the ground adequately and expediently so all setting and retrieving was done using the slack-taking reel.

Due to limited deck space onboard the vessel only one string of pots was usually on board at any one time. This eliminated time and effort as the pots did not need to be stacked so tightly. Both strings of pots were stacked onboard when moving substantial distances. Setting and hauling gear are shown in Figures 8 and 9.

Bait

A standardized amount of bait was used in each pot throughout the 2002 survey to reduce variables. The bait consisted of hake, squid, and herring and was provided by the vessel. The amount of bait provided was adequate for the entire survey.

Sablefish Marking

All healthy sablefish greater than 50 centimeter (cm) fork length were measured, tagged, and released. There were no additional marks used this year. Sablefish 50 cm and smaller were released without marking due to concerns that these small fish might not be retained consistently by all vessels during the commercial fishery and that this would adversely affect the mark-recapture estimates.

A tagging station was set up adjacent to the hopper on the starboard side of the vessel (Figure 10). A pot was brought on board and the fish were released into the hopper which contained enough water to cover the fish. A vessel crew member randomly captured by hand the sablefish one at a time, carried it over to the sampling station and placed the sablefish on the measuring board (Figures 11, 12, and 13). An ADF&G staff member measured the fish to the nearest centimeter (fork length) and tagged the sablefish near the anterior base the dorsal fin on the left side of the fish with a green plastic T-bar anchor tag from Hallprint™[2] in Australia (Figures 14 and 15). Tag numbers 6700 through 9999 and 14601 through 16597 were used on this survey. The fish were tagged using Avery Dennison ™ Mark II™ Pistol Grip Tools, (#10651) with Avery Dennison ™ Heavy Duty short needles (#08913). The fish were then placed head first into a chute with running water that released the fish overboard with minimal damage. A second ADF&G staff stood nearby and recorded the tag number and length onto the NSEI Sablefish Pot Survey Tag Release Form (Figure 13; Appendix B). This person also recorded bycatch recovery data for previously tagged sablefish and kept track of each thirteenth fish for sampling purposes.

Previously Tagged Sablefish

In contrast to the 2001 survey protocol sablefish captured during the 2002 survey that had been tagged by ADF&G either this year or in previous years were not retagged. The sablefish tagged in previous years were measured, the tag number was recorded, the set location was noted, and the fish were then re-released with the original tag in place. Sablefish that had been tagged on this survey were noted and released. Sablefish captured that had been tagged previously by other agencies had their tags removed and

[2] Product names used in this publication are included for scientific completeness but do not constitute product endorsement.

the tags were returned to the marking agency along with the recovery data, including lengths and recovery locations.

Biological Sampling

The sampling goal for sablefish for the survey was 450–500 samples.

A sampling station was set up across the deck from the tagging station on the port side of the vessel (Figure 16). The ADF&G staff recording the tagging data kept track of the first and every thirteenth sablefish at each station (including those less than or equal to 50 cm); this fish was set aside for biological sampling. This sampling rate was chosen to provide the required 450–500 samples and this rate was continued throughout the survey to assure that each station was sampled at the same rate.

The third ADFG staff took biological data including length (to nearest 10 mm), sex, stage of gonad maturity, and otoliths. The stage of gonad maturity was determined based on the Sablefish Maturity Codes and with the aid of a NMFS gonad maturity photo sheet (Appendix C). Otoliths were extracted and processed according to the Instructions for Labeling and Shipping Otoliths and sent to the ADF&G otolith processing lab in Juneau for aging. Weights were not taken due to the concern that at sea weights may not be accurate. The biological data was recorded on the Biological Data Collection Form.

ADF&G staff cleaned and dressed the fish to industry standards, vessel crew iced the sampled fish, and the fish were sold to offset survey costs. The fish were sold to Icicle Seafoods in Petersburg on June 24 and to Taku Fisheries at Auke Bay on June 30 at market price.

Bycatch

The bycatch of groundfish was identified by species and recorded for each set.

Data Management

Between sets all field data was entered onto a portable version of the Region 1 relational database Alexander (Alex) for the second year (Figure 17). Two portables were used for data entry this year and it was determined that data from each specific table should always be entered onto the same computer to avoid confusion in downloading the data and to enable onboard analysis. Data were uploaded in Juneau onto the Regional Alex database at the completion of the survey. The ability to enter data in the field, soon after the data was collected, provided for more accurate data and precluded several days worth of data entry upon return from the survey. The survey data were further edited and summarized after completion of the survey. Age data was entered at a later time after it became available from the aging lab.

RESULTS

Setting

Twenty-six sets were made resulting in a total of 910 individual pots being set and 907 retrieved. A total of 6,327 sablefish were captured by pot gear. Since the catches were enumerated per set and not by individual pot, per pot data is not available. The average number of sablefish captured per pot for a set ranged from 1 to 15 with the survey average being 7 sablefish per pot. The minimum and maximum depths recorded for the ends of the sets were 250 and 399 fathoms respectively. The mean of the average depth per set was 344 fathoms. Soak time was measured from the first anchor overboard to the first anchor on board and ranged from 7 hours 21 minutes to 40 hours 56 minutes. The average soak time for a set was 17 hours 40 minutes (Table 3).

Sablefish Marking

Of the 6,327 sablefish captured during the survey 30 sablefish were determined to be in questionable condition and therefore not marked prior to release, 373 fish measured 50 cm or less and therefore were released unmarked, 167 were released healthy as they already had a tag and 523 were retained for biological samples. The remaining 5,229 sablefish were tagged and released.

Marking goals were exceeded in two of the four statistical areas (Table 4). Goals were not met in Statistical Area 345603 due to poor fishing on most of the sets and in Statistical Area 345631 due to being too close to the goal to make an additional set. In Statistical Area 345701 the goal was met. Good catches on the last set of the survey resulted in exceeding the goal for Statistical Area 345731 and in exceeding the overall survey goal.

Previously Tagged Sablefish

One hundred and fifty four sablefish that had been tagged in previous years by ADF&G were captured in the pots. These previously tagged sablefish were all originally released in NSEI and consisted of one fish from the 1988 release, one from the 1997 release, three from the 1998 release, one from the 1999 release, 18 from the 2000 release, and 130 from the 2001 release. Thirteen tags from this survey were recaptured. In addition two Canadian tagged sablefish, one a 1998 series and one a 1999 series and one NMFS Auke Bay tagged sablefish were recovered and these tags were returned to the appropriate tagging agency with recovery information.

Biological Sampling

Of the 6,327 sablefish captured, fork lengths were recorded for 6,278 fish (Figure 18). The sablefish ranged in length from 42 cm to 101 cm (Table 5). The mean length was 60 cm and a mode was noted around 55 cm (Figure 18).

On the 521 sablefish where sex was noted lengths were taken on 518, and the females ranged in length from 43 to 89 cm and averaged 60 cm while males ranged from 45 to 79 cm and averaged 58 cm (Figures 19 and 20). These samples showed 45 percent males and that the majority of the adults were resting and the majority of the juveniles with either immature or maturing (Table 6; Appendix B). Two males and one female were found in ripe condition.

Ages from the samples are not available at this time.

Bycatch

Bycatch was minimal. The primary bycatch consisted of 772 arrowtooth flounder and 616 Dover sole. Sixty-two shortspine thornyhead, 4 rougheye rockfish, 2 redbanded rockfish, 78 halibut, 1 grenadier, 2 Pacific sleeper sharks and 12 brown king crab were also landed in the pots (Table 7;, Figure 21).

Table 1. Target number of fish to mark in each statistical area (total N=5,000) NSEI pot survey, 2002.

	Statistical Area			
	345603	345631	345701	345731
Target Sample	686	1,738	2,690	763
Percentage for Statistical Area	14%	35%	36%	15%

Table 2. Survey crew on the NSEI pot survey, 2002.

Vessel Crew	ADF&G Staff, Leg 1	ADF&G Staff, Leg 2
David Hasselquist (skipper)	Kamala Carroll	Kamala Carroll
Robin Hasselquist	Deidra Holum	Eric Coonradt
Darwin Nelson	Beverly Richardson	Beverly Richardson
Steve Custodio (deck boss)		
Ryan Barr		
Phillip Roupoli		

Table 3. Set summary for NSEI pot survey, June 15–June 30, 2002.

Set	Statarea	Start Longitude	Start Latitude	End Longitude	End Latitude	Second Anchor Over	Soak Time in Hours	Pots Retrieved	Start Depth	End Depth	Average Depth	Healthy discard	Not marketable discard	Too small discarded	Retained Samples	Tagged and released	Total Captured	Average Sable per Pot
1	345701	57 2.37	134 39.00	57 4.87	134 40.35	6/16/02 2:52	7:21	35	265	325	314	4		1	4	43	52	1
2	345701	57 9.47	134 42.84	57 11.37	134 46.07	6/16/02 5:11	12:27	35	371	326	348	8		30	26	290	354	10
3	345631	56 52.44	134 37.78	56 53.02	134 33.71	6/16/02 14:58	18:50	35	367	364	368	3		18	27	289	337	10
4	345631	56 47.97	134 33.31	56 47.78	134 37.66	6/16/02 23:30	16:05	35	394	394	396	17		89	35	290	431	12
5	345631	56 42.51	134 33.96	56 40.99	134 36.52	6/17/02 14:13	17:54	35	380	372	375	7		22	21	201	251	7
6	345631	56 38.32	134 36.12	56 37.85	134 31.88	6/17/02 20:26	18:08	35	341	368	355	4		12	13	129	158	5
7	345603	56 27.19	134 36.52	56 25.12	134 34.40	6/18/02 12:27	18:53	35	314	326	320	14		5	20	190	229	7
8	345603	56 18.20	134 28.04	56 20.76	134 28.85	6/18/02 20:10	17:42	35	385	383	387	3		2	6	62	73	2
9	345603	56 13.24	134 27.38	56 11.01	134 28.57	6/19/02 12:23	19:31	35	385	337	362			1	9	91	101	3
10	345603	56 13.76	134 26.32	56 16.45	134 25.95	6/19/02 17:52	20:14	35	322	394	386				5	48	53	2
11	345603	56 27.75	134 36.07	56 25.30	134 35.46	6/20/02 12:20	19:19	35	321	308	313	8		8	16	162	194	6
12	345603	56 20.29	134 29.25	56 23.02	134 28.01	6/20/02 18:30	19:55	35	355	399	391	4		6	8	92	110	3
13	345631	56 37.82	134 35.74	56 35.62	134 35.01	6/21/02 12:26	19:50	35	340	328	319	1		2	8	78	89	3
14	345631	56 30.70	134 30.18	56 33.33	134 30.40	6/21/02 19:41	15:24	35	359	353	340				4	37	41	1
15	345631	56 52.42	134 40.11	56 52.03	134 35.79	6/22/02 16:58	16:10	35	337	375	364	3		14	22	227	266	8
16	345631	56 56.84	134 41.80	56 58.87	134 40.43	6/22/02 19:00	17:20	35	340	328	338	7		5	17	181	210	6
17	345631	56 55.17	134 38.25	56 54.19	134 34.73	6/23/02 16:36	40:56	35	350	364	359	11	1	12	26	274	324	9
18	345701	57 4.18	134 45.29	57 1.61	134 43.97	6/25/02 7:45	12:37	35	342	328	336	5		15	25	249	294	8
19	345701	57 14.15	134 44.96	57 15.94	134 41.35	6/25/02 14:43	20:33	35	314	363	460	5	2	2	15	160	184	5
20	345701	57 19.69	134 40.21	57 22.35	134 39.78	6/26/02 1:30	15:24	35	365	340	324	9		3	16	178	206	6
21	345701	57 26.11	134 43.58	57 27.62	134 40.49	6/26/02 15:34	16:56	35	330	272	298	16	3	41	44	421	525	15
22	345701	57 23.78	134 45.65	57 22.41	134 42.19	6/26/02 22:33	14:34	35	361	316	316	6	2		16	162	186	5
23	345701	57 24.10	134 40.76	57 26.44	134 40.32	6/27/02 12:02	20:40	32	355	270	288	10	2	31	30	312	385	12
24	345731	57 36.70	134 50.37	57 36.03	134 46.23	6/27/02 17:23	19:28	35	250	313	317	5	12	12	28	254	311	9
25	345731	57 50.72	134 51.89	57 48.11	134 52.61	6/28/02 17:28	15:08	35	287	279	282	12	8	8	36	373	437	12
26	345731	57 42.65	134 45.71	57 45.17	134 47.32	6/29/02 12:43	8:22	35	270	286	283	10		34	46	436	526	15
						Avg	17:40	907		Avg	343.81							
						Min	7:21				Totals	172	30	373	523	5229	6327	7
						Max	40:56											

Table 4. Number of tags released by statistical area NSEI pot survey, 2002.

Statistical Area	Tagged		Objective	
	Number	Percentage	Number	Percentage
345603	645	12%	686	14%
345631	1,706	33%	1,738	35%
345701	1,815	35%	1,812	36%
345731	1,063	20%	763	15%
Survey area total	5,229	100%	5,000	100%

Table 5. Sablefish length summary for biological sub-sample and for all sablefish landed, NSEI pot survey, 2002.

	Subsample		Overall
	Male	Female	
n (length) =	234	284	6278
Average length cm	58	60	60
Maximum length cm	79	89	101
Minimum length cm	45	43	420

Table 6. Sablefish maturities, NSEI pot survey, 2002

	Male		Female		Total	
	n	% of Total	n	% of Total	n	% of Total
Immature	80	34%	29	10%	109	21%
Maturing Juvenile	46	20%	142	50%	188	36%
Mature/Developing	19	8%	20	7%	39	7%
Spawning	2	1%	1	0%	3	1%
Spent/Post Spawning	5	2%	31	11%	36	7%
Resting	83	35%	63	22%	146	28%
Total	235	100%	286	100%	521	100%

Table 7. Bycatch, by set and overall, NSEI pot survey, 2002.

Set	Sablefish	Arrowtooth Flounder	Dover Sole	Shortspine Thornyhead	Rougheye Rockfish	Shortraker Rockfish	Redbanded Rockfish	Halibut	Grenadier	Pacific Sleeper Shark	Corals	Brown King Crab	Total
1	52	6	37			1		1					97
2	354	3	13	1				2					373
3	337	11	28										376
4	431	17	35	1				2					486
5	251	87	19					6					363
6	158	127	19	2				10					316
7	229	26	1	1				7					264
8	73	44	14	4				1		1			137
9	101	31	14	4	1			2		1			154
10	53	70	9	4	1	3		3	1				144
11	194	34	13	8				5					254
12	110	116	28	1				2					257
13	89	99	3	3				10				11	215
14	41	20	16	10		5	1	5			1		99
15	266	27	87	3				6					389
16	210	23	50	1				9				1	294
17	324	7	58	2				1					392
18	294	20	53	4		1		2					374
19	184	1	68	3									256
20	206	1	30				1	1					239
21	525			3									528
22	186	2	10	4									202
23	385		4	1	2								392
24	311		1	1									313
25	437		6	1				3					447
26	526												526
Total	6,327	772	616	62	4	10	2	78	1	2	1	12	7,887

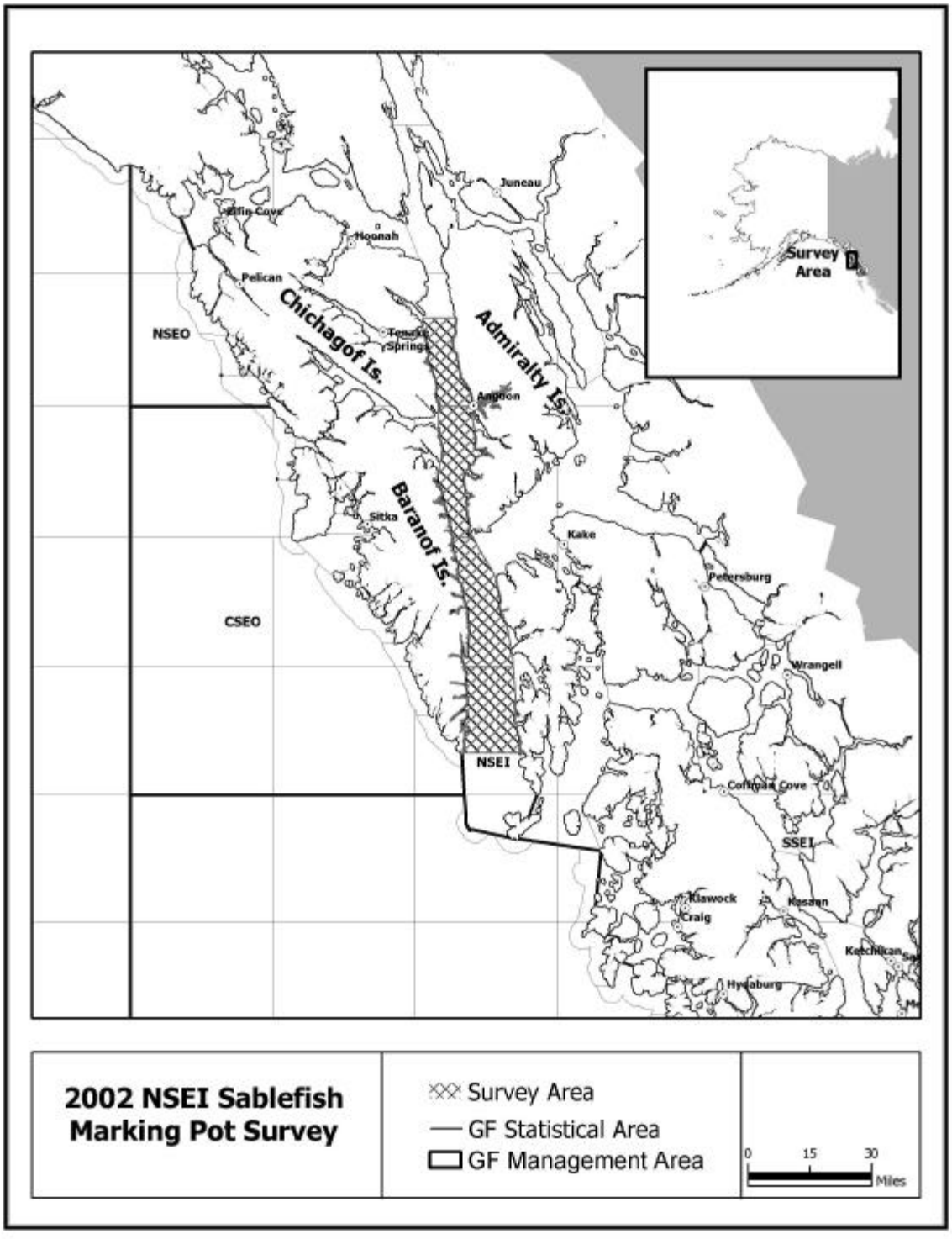

Figure 1. Sablefish survey area.

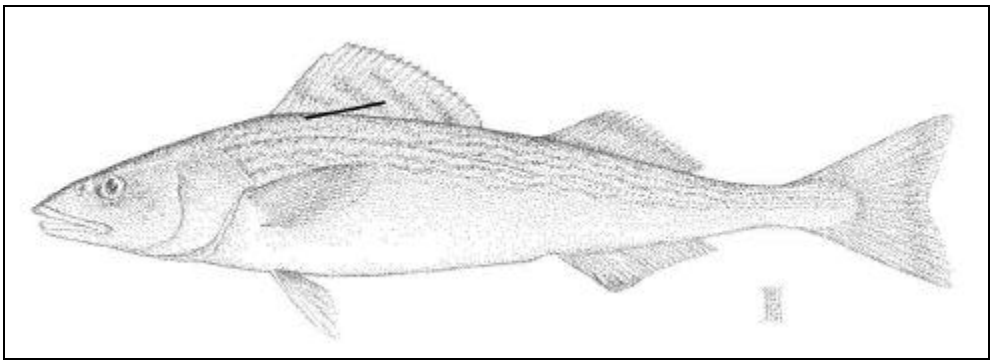

Figure 2. Sablefish tag placement area, NSEI pot survey 2002.

Figure 3. Recording set data, NSEI pot survey, 2002.

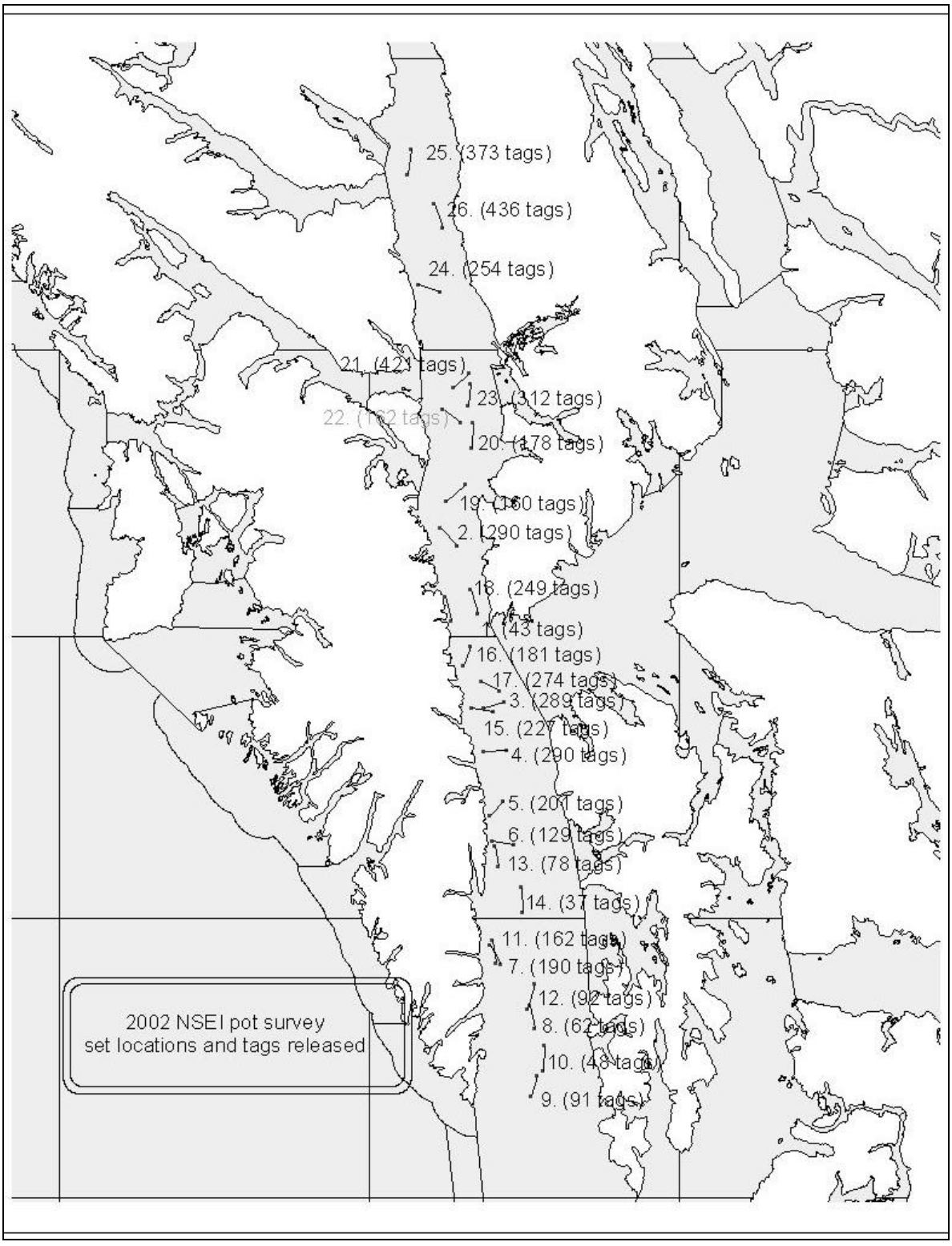

Figure 4. NSEI pot survey set locations and number of tags released per station. 2002.

Figure 5. Stacked sablefish pots, NSEI pot survey, 2002.

Figure 6. Slack-taking reel and sablefish pot, NSEI pot survey, 2002.

Figure 7. Deck set up with slack-taking reel, NSEI pot survey, 2002.

Figure 8. Setting gear, NSEI pot survey, 2002.

Figure 9. Hauling and dumping a pot into the hopper, NSEI pot survey, 2002.

Figure 10. Tagging station, NSEI pot survey, 2002.

Figure 11. Sablefish in hopper, NSEI pot survey, 2002.

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Figure 16. Sampling station, NSEI pot survey, 2002.

Figure 17. Data entry between sets, NSEI pot survey, 2002.

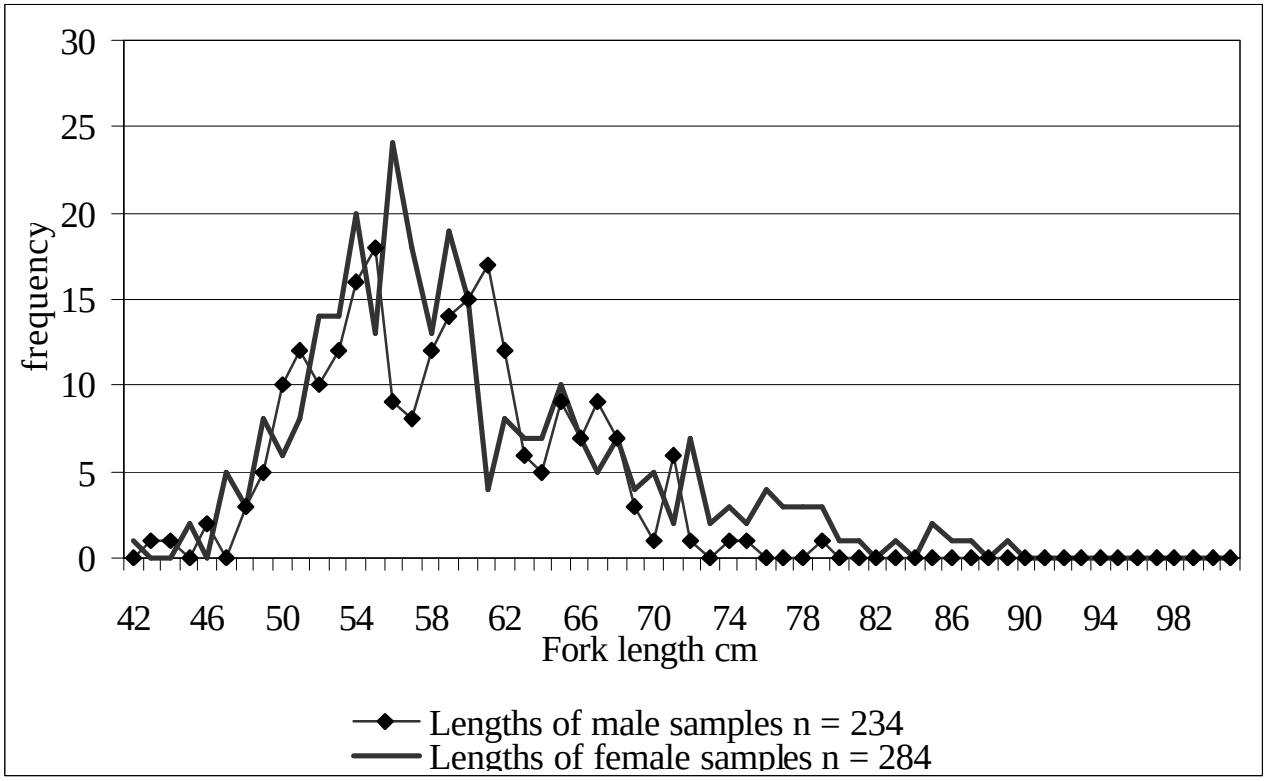


Figure 18. Percent frequency of lengths of tagged, sampled and total captured sablefish, NSEI pot survey 2002

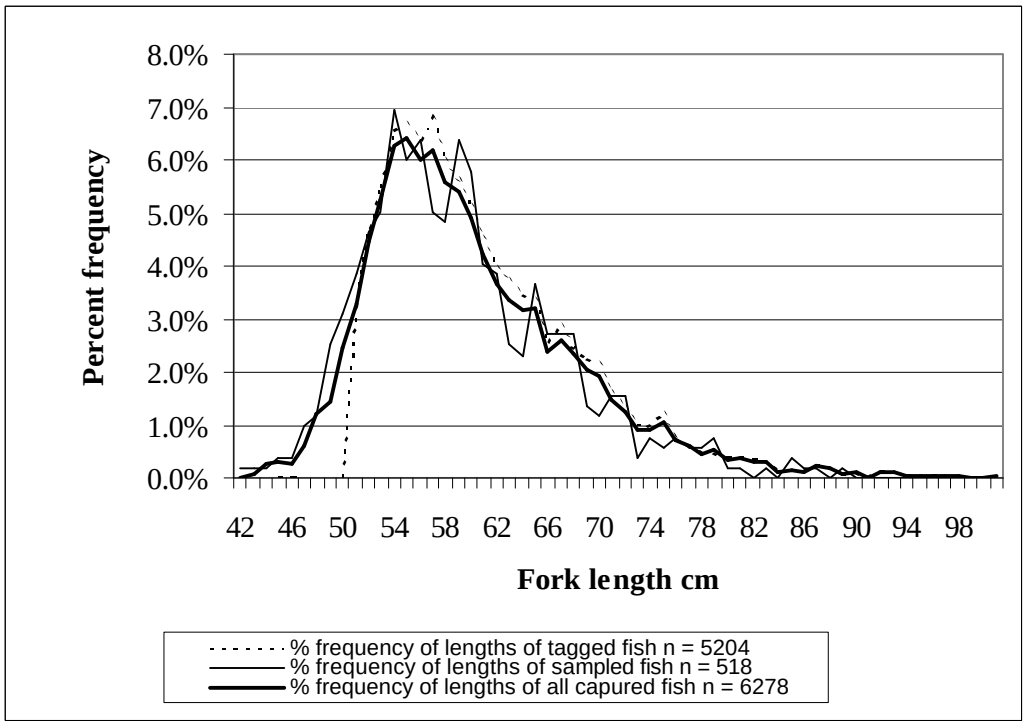


Figure 19. Sablefish lengths by sex for samples, NSEI pot survey, 2002.

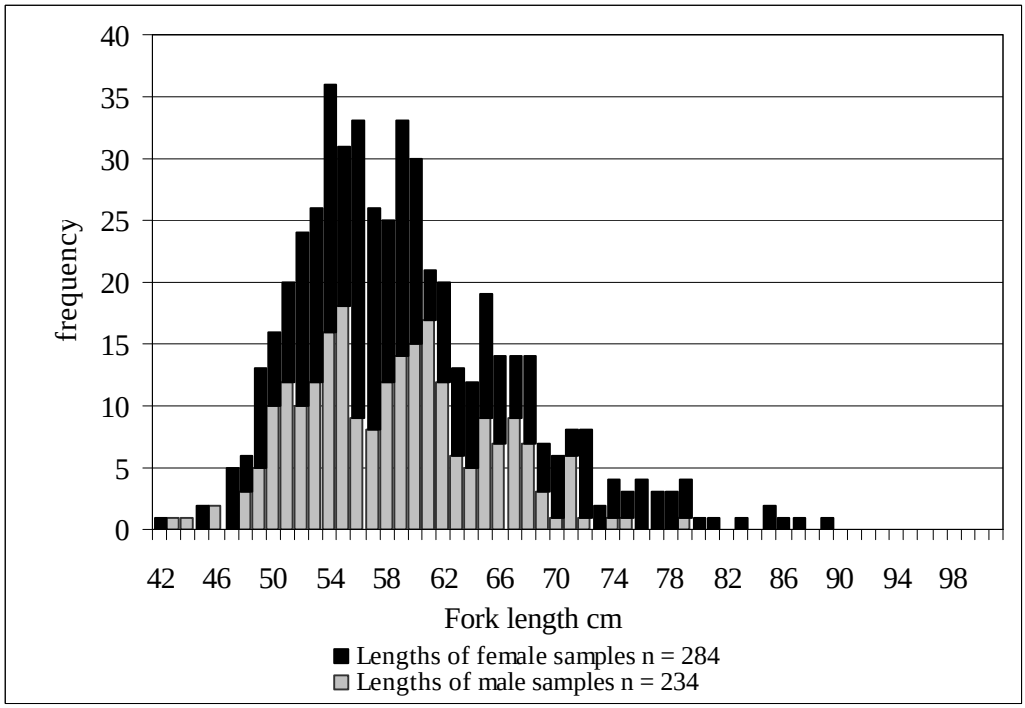
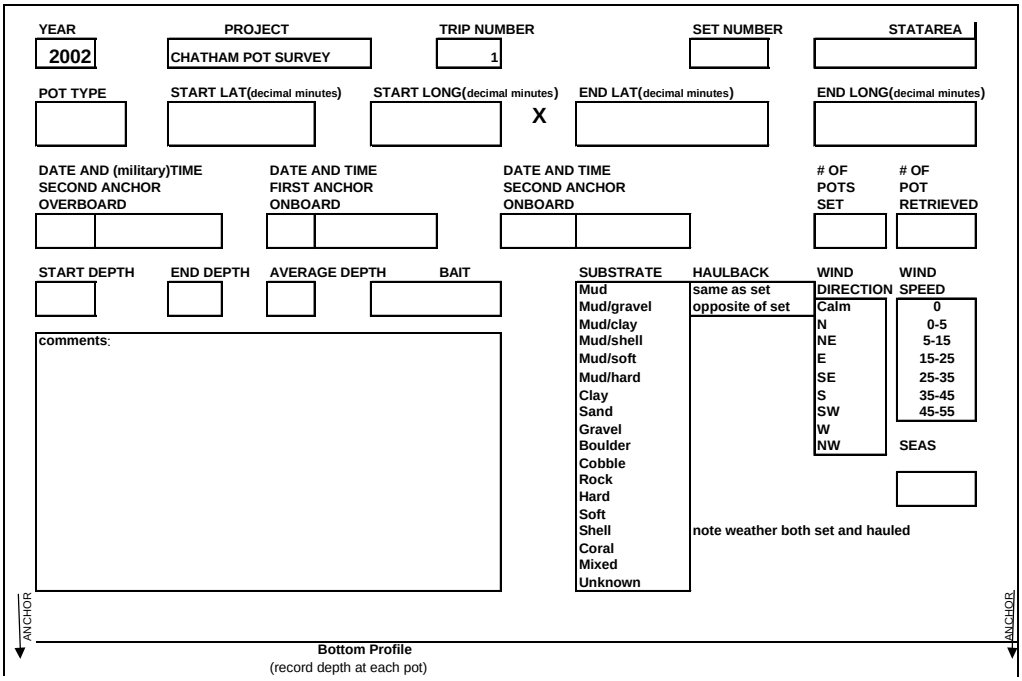


Figure 20. Sablefish lengths by sex as portion of total lengths, NSEI pot survey, 2002.

Figure 21. Pacific sleep shark in sablefish pot, NSEI pot survey, 2002.

APPENDICES

Appendix A. Sablefish Pot Survey Set Form.



Appendix B. NSEI Sablefish Pot Survey Tag Release Form.

Project: NSEI Sablefish Pot Survey Tag Release Form **Set**_____

Year 2002 **Trip** 1 **Date**_____ **Pg no.**____

(number sets consectutivelythroughout trip)

	TAG NUMBER	LENGTH	COMMENTS		TAG NUMBER	LENGTH	COMMENTS
1				26			
2				27			
3				28			
4				29			
5				30			
6				31			
7				32			
8				33			
9				34			
10				35			
11				36			
12				37			
13				38			
14				39			
15				40			
16				41			
17				42			
18				43			
19				44			
20				45			
21				46			
22				47			
23				48			
24				49			
25				50			

Tagger _____ **Recorder**_____

Appendix 2. Sablefish Maturity Codes.

SABLEFISH MATURITY CODES

MATURITY CODE	GONAD CONDITION	MALES (1) DESCRIPTION	FEMALES (2) DESCRIPTION
1	IMMATURE	Testes very narrow, parallel, flat and ribbon-like, almost clear in color. Longitudinal creases are easily discernable.	Ovaries appear as two narrow(slender) ovoids. May be vained. (It may be easiest to determine 2-1 from 2-2 while ovaries are intact in fish)
2	MATURING JUVENILE	Testes enlarging, not ribbon-like, with four discernable creases running full length. Light pink in color. Has not spawned before.	Ovaries enlarging, translucent and pinkish to clear: eggs not yet discernable. Has not spawned before. Will spawn coming year. More veined. Cloudy, but not necessiarily throughout.
3	MATURE/ DEVELOPING	Testes large and white, each with four distinct lobes. No milt present.	Ovaries large and becoming white to yellowish white with developing eggs discernable and firmly attached.
4	SPAWNING	Testes very large and white, extruding milt freely under slight pressure or when cut.	Ovaries very large with large translucent eggs loose within ovary or extruding from the oviduct.
5	SPENT/ POST SPAWNING	Testes large, shriveled, often with wrinkles, and bloodshot. No milt present.	Ovaries shriveled and opaque, soft and flaccid, often reddish in color.
6	RESTING	Testes large and firm, light brown to off-white in color. No milt present. Has spawned previously. May have wrinkles.	Ovaries large, firm and opaque, not shriveled. No eggs discernable. Has Spawned previously. Noticible folical structure.

(R J 1982, 1987, 1994, 1997. Maturity code 6 (resting) added J 1994)

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